

U.S.S.N. 10/656,586

Claim Amendments

Please amend claims 1, 24, and 31 as follows:

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Listing of Claims

1. (currently amended) An apparatus to reduce particle contamination to a semiconductor device process chamber interior by thermal cycling of fasteners comprising:

a process chamber adapted to operate under vacuum, said process chamber having a substantially vertical chamber wall defining a chamber interior, said process chamber selected from the group consisting of a vapor deposition chamber, an ashing chamber and an etching chamber;

a showerhead provided in said process chamber and having a lateral surface engaging said chamber wall; and

a plurality of exterior fasteners extending from an exterior of said process chamber through and penetrating said chamber wall into said chamber interior and into said showerhead, with an exterior portion of said plurality of exterior fasteners physically separated from said chamber interior to prevent said particle contamination from said fasteners to said chamber interior.

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2. (original) The apparatus of claim 1 wherein each of said plurality of exterior fasteners comprises a fastener head and a threaded shank extending from said fastener head, and wherein said fastener head engages an exterior surface of said chamber wall.

3. (original) The apparatus of claim 1 further comprising a gas mix plate carried by said chamber wall above said showerhead.

4. (canceled)

5. (previously presented) The apparatus of claim 1 further comprising a confinement ring provided in said process chamber beneath said showerhead.

Claims 6-20 (canceled)

21. (previously presented) The apparatus of claim 1, wherein said showerhead comprises a plurality of fastener openings in said lateral surface of said showerhead each one of said fastener openings arranged to receive one of a corresponding one of said plurality of exterior fasteners.

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22. (previously presented) The apparatus of claim 21, wherein said plurality of fasteners and fastener openings are threaded.

23. (previously presented) The apparatus of claim 1, where said plurality of exterior fasteners are arranged equally spaced from each other along a circumference of said chamber wall.

24. (currently amended) An apparatus to reduce particle contamination to a semiconductor device process chamber interior by thermal cycling of fasteners comprising:

a process chamber adapted to operate under vacuum, said process chamber having a substantially vertical chamber wall defining a chamber interior, said process chamber selected from the group consisting of a vapor deposition chamber, an ashing chamber and an etching chamber;

a showerhead provided in said process chamber and having a lateral surface engaging said chamber wall; and

a plurality of exterior fasteners extending from an exterior of said process chamber through and penetrating said chamber wall into said chamber interior and into said showerhead, an exterior

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of said plurality of exterior fasteners physically separated from said chamber interior by abutment of said showerhead against said chamber wall to prevent said particle contamination from said fasteners to said chamber interior.

25. (previously presented) The apparatus of claim 24 wherein each of said plurality of exterior fasteners comprises a fastener head and a threaded shank extending from said fastener head, and wherein said fastener head engages an exterior surface of said chamber wall.

26. (previously presented) The apparatus of claim 24, wherein said showerhead comprises a plurality of fastener openings in said lateral surface of said showerhead each one of said fastener openings arranged to receive one of a corresponding one of said plurality of exterior fasteners.

27. (previously presented) The apparatus of claim 26, wherein said plurality of fasteners and fastener openings are threaded.

28. (previously presented) The apparatus of claim 24, where said plurality of exterior fasteners are arranged equally spaced from each other along a circumference of said chamber wall.

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29. (previously presented) The apparatus of claim 24 further comprising a gas mix plate carried by said chamber wall above said showerhead.

30. (previously presented) The apparatus of claim 24 further comprising a confinement ring provided in said process chamber beneath said showerhead.

31. (currently amended) An apparatus to reduce particle contamination to a semiconductor device process chamber interior by thermal cycling of fasteners comprising:

a process chamber adapted to operate under vacuum, said process chamber having a substantially vertical chamber wall defining a chamber interior, said process chamber selected from the group consisting of a vapor deposition chamber, an ashing chamber and an etching chamber;

a showerhead provided in said process chamber and having a lateral surface engaging said chamber wall; and

a plurality of exterior fasteners, each exterior fastener

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extending from an exterior of said process chamber through a respective opening in said chamber wall to penetrate said chamber wall into said chamber interior and into a corresponding opening in said lateral surface such that an exterior surface of said plurality of exterior fasteners are physically separated from said chamber interior by abutment of said showerhead against said chamber wall to prevent said particle contamination from said fasteners to said chamber interior.

32. (previously presented) The apparatus of claim 31 wherein each of said plurality of exterior fasteners comprises a fastener head and a threaded shank extending from said fastener head, and wherein said fastener head engages an exterior surface of said chamber wall.

33. (previously presented) The apparatus of claim 32, wherein said plurality of fasteners and fastener openings are threaded.

34. (previously presented) The apparatus of claim 31, where said plurality of exterior fasteners are arranged equally spaced from each other along a circumference of said chamber wall.

35. (previously presented) The apparatus of claim 31 further

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comprising a gas mix plate carried by said chamber wall above said showerhead.

36. (previously presented) The apparatus of claim 31 further comprising a confinement ring provided in said process chamber beneath said showerhead.